REMARKS/ARGUMENTS

Claims 1-4, 6-18 and 21-42 were previously pending in this application. Claims 1, 3, 12, 13, 15-18, 21, 22, 24, 29, 31, 34, 37, and 39 have been amended. Claim 14 has been canceled. Claims 17 and 18 stand withdrawn from consideration pending allowance of independent claim 1. Support for the amendments can be found throughout the specification and claims as previously filed. As such, no new matter enters by way of the present amendment. Following entry of the amendment, claims 1-4, 6-13, 15-18, and 21-42 remain pending, of which claims 1-4, 6-13, 15-16, and 21-42 are under consideration. Reconsideration of the subject application as amended is respectfully requested.

I. ELECTION/RESTRICTION

The Finality of the Election Requirement is acknowledged. As such, claims 17 and 18 are presently withdrawn from consideration pending allowance of generic claim 1.

II. CLAIM REJECTIONS UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

Claims 1-4, 6-18, and 21-42 stand rejected under 35 U.S.C. § 112, second paragraph as alleged being indefinite due to the recitation of the claim term "high contrast." Without agree that such term is indefinite, applicants have amended to claims to delete reference to the term "high contrast," and instead to recite that each of the optical cores has a contrast relative to the undercladding layer greater than 2%. As such, it is respectfully submitted that this rejection is now moot. As such, withdrawal of this rejection is respectfully requested.

III. CLAIM REJECTIONS UNDER 35 U.S.C. § 103(A)

A. Rejection Based on Bazylenko, in view of Dragone

Claims 1-2, 15-16 and 22-42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the cited portions of U.S. Patent No. 6,154,582 to Bazylenko, *et al.* (hereinafter "Bazylenko"), alone or in view of the cited portions of U.S. Patent No. 5,136,671 to Dragone, *et al.* (hereinafter "Dragone") and U.S. Patent No. 5,221,309 to Kyoto (hereinafter "Kyoto"). This rejection is respectfully traversed for at least the reasons which follow.

The present claims relate to methods, systems, and media for forming optical waveguides including the formation of a high-density plasma and the deposition of a plurality of

separated silicate glass optical cores on an undercladding layer using the high-density plasma, wherein the optical cores define a sequence of gaps. Each of the silicate glass optical cores is formed with a refractive index greater than a refractive index of the undercladding layer such that each of the optical cores has a contrast relative to the undercladding layer greater than 2%.

The Examiner acknowledges that Bazylenko does not disclose a plurality of separated cores, but asserts that it "would have been obvious to create more than one waveguide core so as to be able to multiply the amount of data carried." *Office Action mailed Feb. 14, 2005* at page 3. In further support of the rejection, the Examiner relies on Dragone to allegedly show "that multiple separated waveguides is conventional." *Id.* Further, the Examiner relies on Kyoto to allegedly teach that "a large index difference allow for easy propagation of light." *Office Action mailed Aug. 18, 2005* at page 4.

At a minimum, in order to arrive at the presently claimed invention, one of skill would have to modify Bazylenko to at least (1) incorporate a plurality of separated silicate glass optical cores over an undercladding layer, (2) wherein the optical cores define a sequence of gaps, (3) such that each of the optical cores has a contrast relative to the undercladding layer greater than 2%.

First, as discussed above and acknowledged by the Examiner, whatever else Bazylenko does disclose, it does not disclose or suggest a plurality of optical cores. Further, there is no specific disclosure to teach or suggest that the plurality of optical cores should define a sequence of gaps. The Examiner's reliance on Dragone to illustrate multiple, separate waveguides as conventional does nothing to remedy these deficiencies. Whatever else Dragone does disclose, it does not disclose single waveguides with multiple cores defining a sequence of gaps. Rather, it discloses a multiplex system of a plurality of separate waveguides. The Examiner points to no specific disclosure concerning the optical cores within the waveguides. Further, the Examiner provides no direction as to how one of skill would be lead to modify the methodologies of Bazylenko related to making waveguides based on the disclosure of Dragone related to multiplexes of waveguides.

More specifically, the teachings of Dragone are directed to various configurations of an interconnection apparatus which may be used to join optical cores of varying lengths to minimize crosstalk between the individual waveguides. Dragone is silent with regard to methods

for making even the single core waveguides which are multiplexed *via* the disclosed optical interconnection apparatus, much less methods for making a waveguide comprising multiple optical cores defining a series of gapes. Even if one of skill in the art were to look to combine the teachings of Dragone and Bazylenko, at most they would be lead to separately manufacture individual optical cores and later combine the cores into a mutiplex *via* a connector, as taught by Dragone.

Nonetheless, even assuming *arguendo* that one of skill in the art would be motivated to attempt to incorporate additional cores into the waveguide disclosed by Bazylenko, there is no teaching or suggestion of adequate methodologies, systems or media to obtain a plurality of optical cores such that each of the optical cores has a contrast relative to the undercladding layer greater than 2%. Although Bazylenko does disclose that possible index differences between the core and the cladding layers may range from "0.004 to about 0.02" the only embodied difference is about 0.008. *See Bazylenko* at Col. 6, Ln. 25-33 and Example 1. As such, Bazylenko does not teach, suggest, or contemplate, a plurality of optical cores with index contrasts as now claimed.

With regard to the alleged teachings of Kyoto, Kyoto merely mentions in passing that "large aperture optical fibers" may have contrasts about 2 to 4%, without any indication , explanation, or discussion of particular methods by which one may be able to achieve such contrast levels. Further, there is no indication that such contrast levels are desirable or obtainable in multi-core configurations. Moreover, the methodologies which are the focus of Kyoto are flame hydrolysis methodologies, which are not directly applicable to PECVD methodologies, much less to high-density multi-core waveguide preparation methodologies. As such, one of skill in the art would not look to combine the teachings of Kyoto and Bazylenko with any reasonable expectation of success.

Further, with regard to claim 2 (and dependent claims 3-11), claim 22 (and dependent claims 23-28), claim 29 (and dependent claims 30-36), and claim 37 (and dependent claims 38-42), as well as non-rejected claim 12, the PECVD conditions taught by Bazylenko do not amount to nor suggest the recited conditions for forming the high-density plasma as required by the claims. More particularly, the recited temperature and RF power density are greater than the conditions disclosed by Bazylenko, and given the limitations of PECVD methodologies in

this regard, one of skill in the art would not be lead to optimize the temperature and/or power density in the ranges claimed based on the teachings of Bazylenko.

With regard to claims 24-25 (and dependent claim 26), and claims 27, 31-33, and 39-41, as well as non-rejected claims 3-11, relating to nitrogen source gases, Bazylenko specifically teaches that the disclosed methods have the advantage of being carried out in the absence of nitrogen. The use of an oxidant that does not contain nitrogen is a specifically stated purpose of Bazylenko. Thus, Bazylenko teaches away from the use of nitrogen source gases in the disclosed methods, and one of skill in the art would not be lead to modify the teachings of Bazylenko in this regard. More particularly, certain of the dependent claims expressly recite that the nitrogen source gas is molecular nitrogen. As described in the specification, PECVD methods do not produce enough energy to break the nitrogen-nitrogen bond of molecular nitrogen. As such, even assuming *arguendo* that one of skill would view the absence of nitrogen source gases as a "preferred" embodiment, one of skill would still not be lead to select molecular nitrogen as a suitable nitrogen source gas in the methods of Bazylenko. Moreover, there is no suggestion or motivation to arrive at the specifically claimed flow rates or source gas ratios, as recited in certain of the dependent claims.

For at least these reasons, Applicants traverse the rejection of claims 1-2, 15-16 and 22-42, and respectfully request withdrawal of this rejection.

B. Rejection Based on Johnson, in view of Dragone

Claims 1, 2-4, 6-14, 22-26 and 29-42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the cited portions of U.S. Patent No. 6,614977 to Johnson, *et al.* (hereinafter "Johnson"), alone or in view of the cited portions of Dragone and Kyoto. This rejection is respectfully traversed for at least the reasons which follow.

Again, the present claims relate to methods, systems, and media for forming optical waveguides including the formation of a high-density plasma and the deposition of a plurality of separated silicate glass optical cores on an undercladding layer using the high-density plasma, wherein the optical cores define a sequence of gaps. Each of the silicate glass optical cores is formed with a refractive index greater than a refractive index of the undercladding layer such that each of the optical cores has a contrast relative to the undercladding layer greater than 2%.

As above, at a minimum, in order to arrive at the presently claimed invention, one of skill would have to modify Johnson to at least (1) incorporate a plurality of separated silicate glass optical cores over an undercladding layer, (2) wherein the optical cores define a sequence of gaps, (3) such that each of the optical cores has a contrast relative to the undercladding layer greater than 2%.

First, as discussed above and acknowledged by the Examiner, whatever else Johnson does disclose, it does not disclose or suggest a plurality of optical cores. Further, there is no specific disclosure to teach or suggest that the plurality of optical cores should define a sequence of gaps. The Examiner's reliance on Dragone to illustrate multiple, separate waveguides as conventional does nothing to remedy these deficiencies. Whatever else Dragone does disclose, it does not disclose single waveguides with multiple cores defining a sequence of gaps. Rather, it discloses a multiplex system of a plurality of separate waveguides. The Examiner points to no specific disclosure concerning the optical cores within the waveguides. Further, the Examiner provides no direction as to how one of skill would be lead to modify the methodologies of Johnson related to making waveguides based on the disclosure of Dragone related to multiplexes of waveguides.

More specifically, the teachings of Dragone are directed to various configurations of an interconnection apparatus which may be used to join optical cores of varying lengths to minimize crosstalk between the individual waveguides. Dragone is silent with regard to methods for making even the single core waveguides which are multiplexed *via* the disclosed optical interconnection apparatus, much less methods for making a waveguide comprising multiple optical cores defining a series of gapes. Even if one of skill in the art were to look to combine the teachings of Dragone and Johnson, at most they would be lead to separately manufacture individual optical cores and later combine the cores into a mutiplex via a connector, as taught by Dragone.

Nonetheless, even assuming *arguendo* that one of skill in the art would be motivated to attempt to incorporate additional cores into the waveguide disclosed by Johnson, there is no teaching or suggestion of adequate methodologies, systems or media to obtain a plurality of optical cores such that each of the optical cores has a contrast relative to the undercladding layer greater than 2%. Although Johnson does disclose that the optical cladding

can include any number of materials having a lower index of refraction than the thin film forming the optical component, Johnson is silent with regard to the actual magnitude of difference in refractive index, or the desirability of maintaining a specific level of contrast. *See Johnson* at Col. 6-7. In terms of propagation loss, Johnson is focused on hydrogen content alone. As such, Johnson does not teach, suggest, or contemplate, a plurality of optical cores with index contrasts as now claimed.

With regard to the alleged teachings of Kyoto, Kyoto merely mentions in passing that "large aperture optical fibers" may have contrasts about 2 to 4%, without any indication , explanation, or discussion of particular methods by which one may be able to achieve such contrast levels. Further, there is no indication that such contrast levels are desirable or obtainable in multi-core configurations. Moreover, the methodologies which are the focus of Kyoto are flame hydrolysis methodologies, which are not directly applicable to vapor depositions techniques or PECVD methodologies, much less to high-density multi-core waveguide preparation methodologies. As such, one of skill in the art would not look to combine the teachings of Kyoto and Johnson with any reasonable expectation of success.

Further, with regard to claim 2 (and dependent claims 3-11), claim 22 (and dependent claims 23-28), claim 29 (and dependent claims 30-36), and claim 37 (and dependent claims 38-42), as well as non-rejected claim 12, the deposition conditions taught by Johnson do not amount to or suggest the recited conditions for forming the high-density plasma as required by the claims. More particularly, the recited pressure, temperature and RF power density differ from the conditions disclosed by Johnson, and given the limitations of exemplified PECVD methodologies in this regard, one of skill in the art would not be lead to optimize the temperature, pressure and/or power density in the ranges claimed based on the teachings of Johnson. For instance, the only specific deposition conditions described by Johnson involve a PECVD system, wherein a chamber pressure of about 300 millitorr and temperature of 300 °C are utilized. *See Johnson*, Col. 7, Ln. 13-22. Absence a motivation to modify the teachings of Johnson to specifically move to higher-density plasma, one of skill would not be lead to arrive at the claimed deposition conditions.

With regard to claims 4, 25-27, 32-33, and 40-41, as well as non-rejected claims 7-11, relating to molecular nitrogen source gases, Johnson does not disclose the use of molecular

nitrogen as a source gas which is incorporated into the plasma. As described in the specification, PECVD methods do not produce enough energy to break the nitrogen-nitrogen bond of molecular nitrogen. As such, one of skill in the art would not be lead to select molecular nitrogen as a possible nitrogen source gas based on the teachings of Johnson. Moreover, there is no suggestion or motivation to arrive at the specifically claimed flow rates or source gas ratios, as recited in certain of the dependent claims.

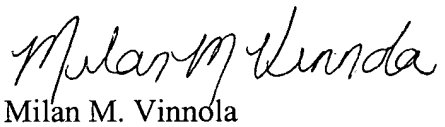
For at least these reasons, Applicants traverse the rejection of claims 1, 2-4, 6-14, 22-26 and 29-42, and respectfully request withdrawal of this rejection.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,



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